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Case Report

Intra oral reconstruction with buccal fat pad: Recent applications of autologous tissue transplantation as a local flap

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ABSTRACT

Intra oral reconstruction with buccal fat pad (BFP) is an identical procedure during reconstructive head and neck surgery. It has a successful outcome in restoring both soft and hard tissues for more than 3 decades. The purpose of this study was to represent a series of cases and review of the recent diversified application of BFP in intra-oral region during reconstruction. The Authors are presenting 12 cases (Male – 8/66.7%; Female – 4/33.33%, mean age – 66.33 years) of BFP reconstruction from small to medium sized defect in oral cavity. The diameter of the BFP graft was between 10 mm and 55 mm. Only one case was restored in mandible while others were in maxillary region. All patients were recovered within a short time. The yellow fat tissues were turned into reddish color within 1 week. Patient recovered with almost normal mucosa before 4th week. BFP reconstruction had considered as a quick and easy to restore flap during most intra-oral reconstruction. Rapid healing without any complications added additional advantage. High blood supply and easy access make it as a first consideration. We also evaluated the merits, demerits, distance between host and donor site, size of defect and site of reconstruction.

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Introduction

Adjusting or mimicking the actual anatomy with proper function is often obliterated after surgery. In oral cavity reconstruction is often required due to resection for cystic lesion or malignancy. Reconstruction with buccal fat pad (BFP) can be considered for its availability and restoring capacity. There are multiple reconstructive materials or different flaps to maintain speech, facial expression, articulation and deglutition. Immediate repair during malignant lesion resection was not appreciated due to monitoring of recurrence. However, there are no relevance between recurrence and reconstruction yet.[1] BFP is durable, easy to harvest and can be considered in settings where access to free flaps are limited and in cases where previous flaps have failed. Intravenous (IV) bisphosphonates (BPs) are frequently used as an antiresorptive medication during bone metastasis from breast, prostate and lung cancers. The osteonecrosis caused by this BPs usually identified by the appearance of exposed bone in oral cavity over 8 weeks. This condition is known as medication related osteonecrosis of the jaw (MRONJ).[2] In the recent days, BFP reconstruction is increasing in MRONJ cases also.

The buccal fat pad (Bichat's fat pad) has a complex relationship to the facial structures. It has 4 parts divided by the parotid duct and facial nerve and vein into anterior and posterior portions possibly named by buccal, pterygoid, superficial temporal and deep temporal part.[1] The main body lies on the anterior border of the masseter muscle and extends deeply to lie on the posterior maxilla and forward along the buccal vestibule (Figure 1). The parotid duct and zygomatic and buccal branches of the facial nerve cross the lateral surface of the fat pad. The buccal extension, which accounts for about half the total weight, lies superficially within the cheek and is largely responsible for the contour of the cheek. The pterygoid and temporal extensions are smaller and situated more deeply. The buccal extension is more appropriate for grafting. Moreover, the buccal extension and main body together constitutes 55%–70% of total weight. The parotid duct courses with the buccal branches of the facial nerve anteriorly (superficial), and on the lateral surface of the BFP, it penetrates the buccinators muscles, entering the oral cavity opposite the second molar. The facial vessels are in the same plane and mark the anterior extent of the BFP. The fat pad varies through the human's lifetime though it's average volume is 9.6 mL with a range of 8.33 mL–11.9 mL. Although, the volume of BFP can change throughout the life.[3] It is attached by 6 ligaments to the maxilla, posterior zygoma, inner and outer rims of the infraorbital fissure, temporalis tendon, and buccinator membrane.[4–7] It has numerous presumed functions including suckling, contributing to mastication, protection and cushioning of neurovascular bundles, separating the muscles of mastication from one another, and aesthetics, amongst others. In the infant, the buccal fat pad prevents the in drawing of the cheeks during sucking, while it enhances intermuscular motion.

The first description was made by Heister in 1732 and later in 1802 by a Frenchman Bichat.[8] Scammon and Goughran described the detail anatomy of BFP first.[9] Then over two centuries the application of BFP was not highlighted. Later in 1977 Egyedi was the first to report the successful clinical use of the buccal fat pad.[8] They used BFP as a pedicle graft, lined with a split thickness skin graft, for the closure of persistent oroantral and oronasal defects in four patients after resection of tumors.[10] Nowadays, BFP has showed potential outcome during reconstruction after MRONJ and oral submucous fibrosis (OSF) treatment also.

Case series

In this report 12 patients (8-Male, 4-Female) were studied after BFP reconstruction. Seven cases underwent carcinoma resection (Figures 2 and 3), 2 oroantral closures, 2 MRONJ and a case of mucosal contracture after tumor resection. The graft positions, condition of defect area, recurrence of oroantral opening, wound contracture, presence or absence of infection and pain, foul smelling were considered. Healing was assessed by the graft integrity, necrosis and graft epithelialization.

All the cases (Table 1) were immediate reconstruction except a case that was reconstructed after 3 years of resection. The extent and degree of involvement of lesion was determined first. The body of the BFP and the buccal extension were gently mobilized by blunt dissection. Pressure on the cheek extra orally helped to express the fat into the mouth. After the pad had been dissected free from the surrounding tissues, it was softly pulled out from its bed, adjusted into its new position, and sutured

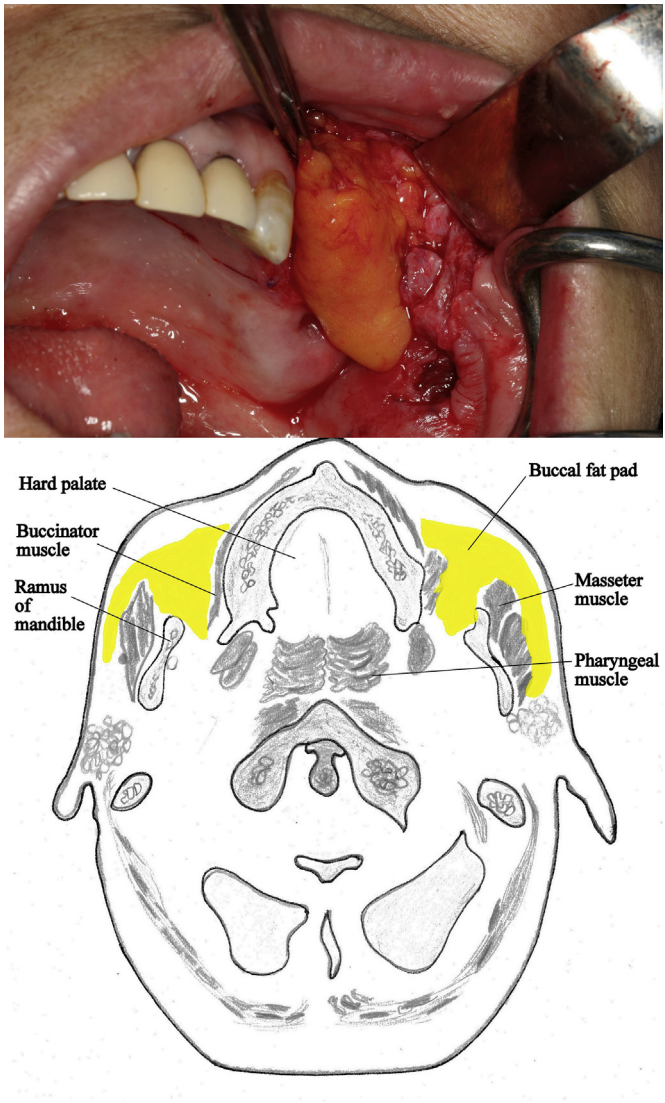

Figure 1. BFP is repositioning clinically and anatomical position of BFP.

without tension (Figure 1). The surrounding connective tissues were kept intact to preserve the total vasculature. Suction must not be applied to donor area to avoid damage. The precise anatomical interrelation among the buccal fat pad, buccal branches of the facial nerve, and parotid duct was maintained.

After transplantation, yellow fat tissues had gradually changed to light reddish masses within one week. Within four weeks, the grafts had almost turned into a normal mucosa. Only one case caused a small perforation less than 2 mm, occurred two days after the surgery because of inappropriate suction. However, the size of the perforation was gradually reduced and then finally closed with absence of any functional disturbances. In the other cases, there were no perforations, breakdowns, contractures, of graft. No delayed healing was observed. In the first case, resection was done and a partial denture was provided to reduce swallowing difficulties. But after 3 years the patient came back with discomfort using partial denture. Then reconstruction by BFP graft was done (Figure 2). The first CT image

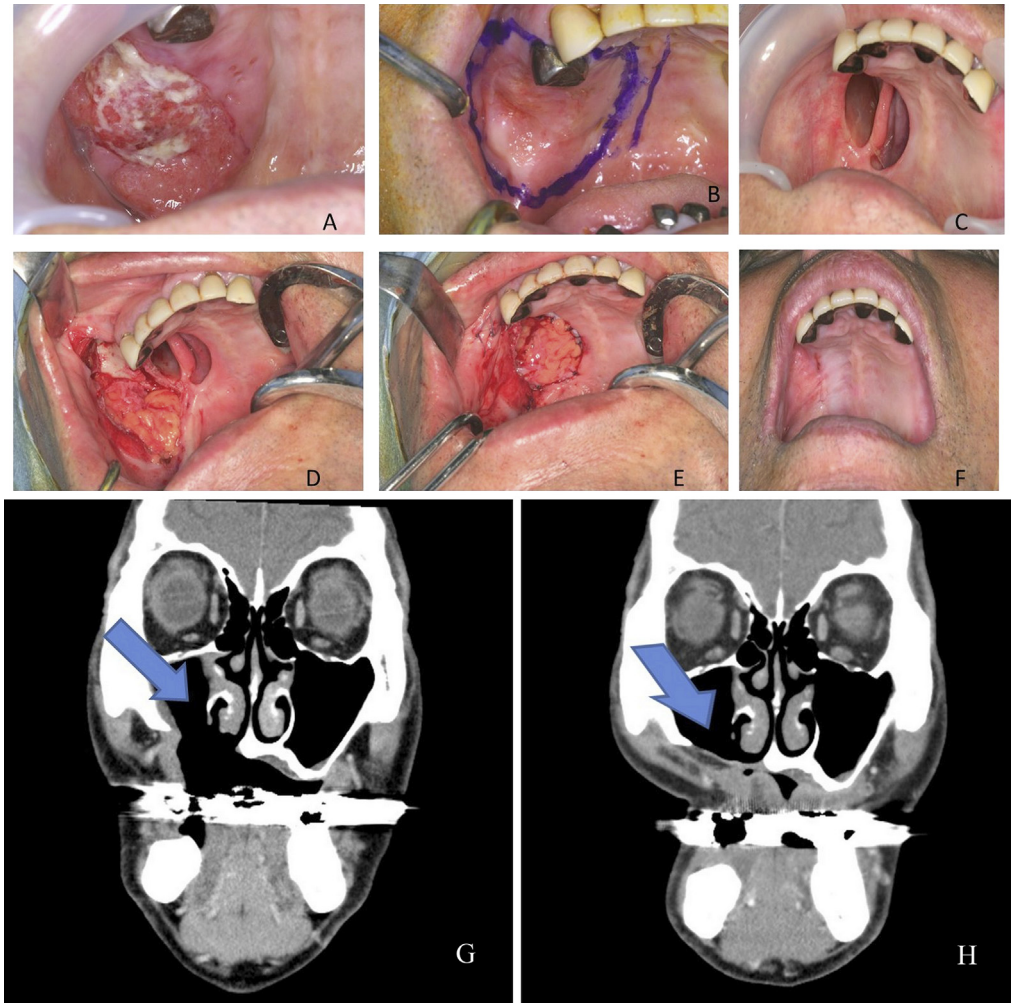

Figure 2. A–F: Intra-oral reconstruction by BFP after maxillary resection in a carcinoma patient. Resection was done and a removable denture was given to close oroantral communication. After 3 years of resection BFP reconstruction was done. G, F: Assessment of reconstruction by CT images.

indicates the communication between oral cavity and maxillary sinus created by carcinoma resection (Figure 2G). Figure 2H represents complete and healthy recovery after BFP reconstruction in palate. In other case, CT images are also showing the quick recovery which was performed just after the surgery (Figure 3E,F).

A bio absorbable membrane was placed over the graft. Fibrin and thrombin spray was used for a rapid attachment with the adjacent host tissue. Moreover, a resin plate was provided to minimize the local irritation. Speech and eating were not affected. The mouth opening was normal and recurrence in oroantral communication did not observed. There were no post-operative infections. Carcinoma patients also received radiotherapy subsequently after reconstruction.

Discussions

The body and buccal process of BFP are ideal for grafting.[11] The size of the covered defect has been up to 60 × 50 × 30 mm in published reports. The most crucial part of this procedure is graft

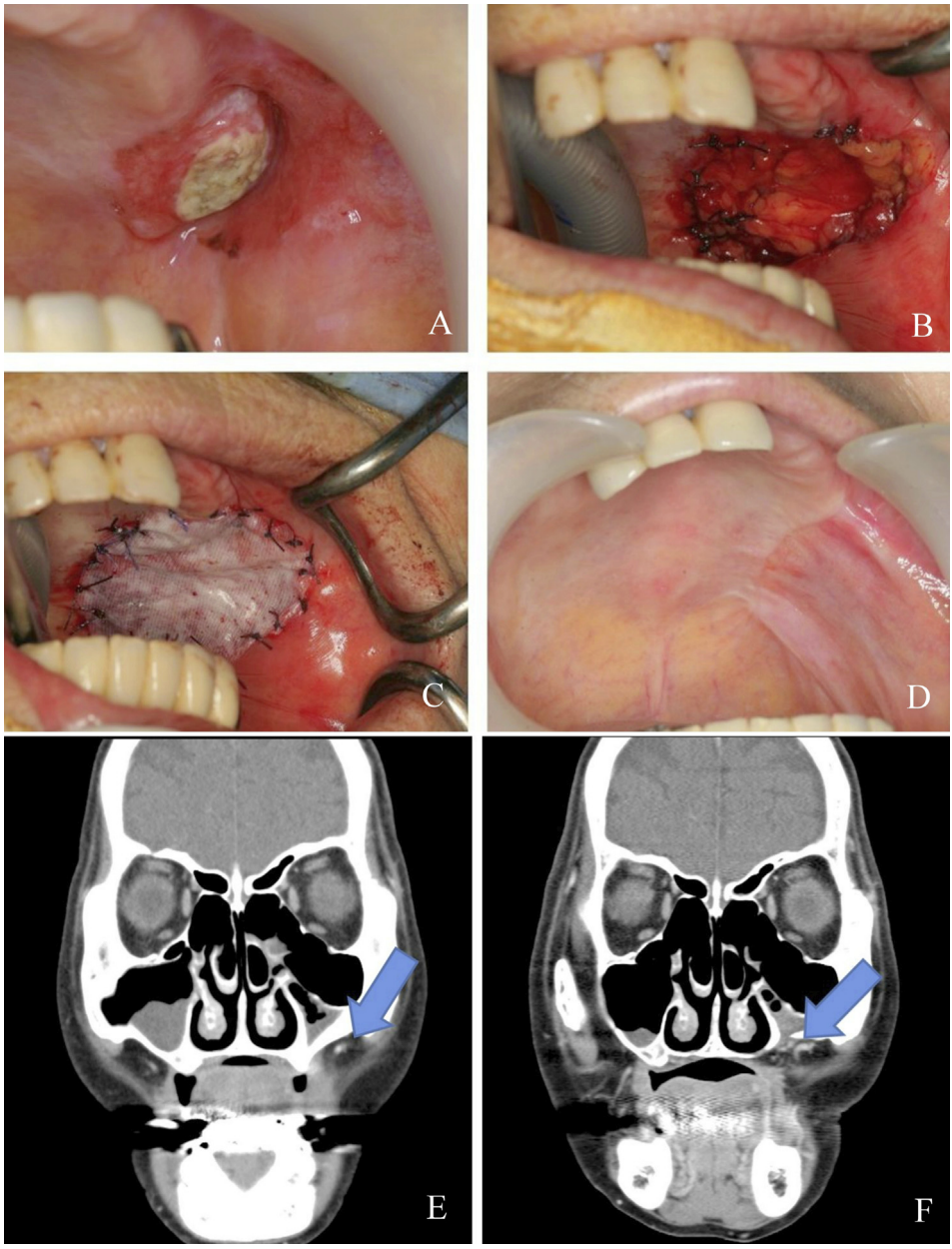

Figure 3. A–D: BFP application after carcinoma resection. A bio absorbable membrane was used to minimize local irritation. E, F: CT evaluation after BFP reconstruction.

preparation. According to author's cases and the literature, it can be said that, the safe size for graft is up to 50 × 40 mm.[7,8,12]

We reviewed English articles discussing BFP grafting from 2013 to 2016 identified by PubMed search. According to published articles in that designated time, total 50 articles described BFP cases. Among them most cases were used in maxilla including alveolar ridge and palate. Buccal mucosa was

Table 1
The detailed summary of 12 patients treated with BFP in our hospital.

No.	Age	Gender	Site of defect	Diagnosis	Size of graft	Follow up	Complication
1	72	Male	Upper right buccal mucosa	Squamous cell carcinoma	42 mm × 35 mm	More than 5 years	None
2	92	Male	Upper left buccal mucosa	Squamous cell carcinoma	30 mm × 35 mm	More than 5 years	None
3	75	Male	Upper right buccal mucosa	Squamous cell carcinoma	24 mm × 20 mm	More than 5 years	None
4	84	Female	Upper right gingiva	Squamous cell carcinoma	12 mm × 18 mm	More than 5 years	None
5	37	Male	Upper left molar region	Oroantral fistula	30 mm × 30 mm	More than 5 years	None
6	76	Female	Upper left buccal mucosa	Chronic mucosal contracture due to surgery	40 mm × 20 mm	5 years	None
7	66	Male	Upper left molar region	Oroantral fistula	25 mm × 10 mm	7 months	Small perforation less than 2 mm
8	76	Male	Lower left molar region	MRONJ	20 mm × 20 mm	6 months	None
9	76	Female	Upper right molar region	MRONJ	12 mm × 10 mm	2 years	None
10	75	Male	Upper left molar region	Squamous cell carcinoma	30 mm × 40 mm	10 months	None
11	65	Male	Upper left molar region	Squamous cell carcinoma	44 mm × 30 mm	8 months	None
12	77	Female	Upper left molar region	Squamous cell carcinoma	55 mm × 40 mm	8 months	None

the next frequent. Using as distant graft might reduce the vascularity. Even after removing necrotic bone in MRONJ, BFP has used with a fare prognosis. Usually the necrotic bone is poorly vascularized. But Rotaru et al describes 10 successful cases. They found only 1 case of bony re-exposure.

The largest one was 62 mm × 18 mm by Horatiu Rotaru et al however; most cases were within 50 mm × 40 mm defect.[13,14] Over that size there was combination of other grafts. All of our cases were in between 10 to 55 mm × 10 to 40 mm. For reconstruction purpose nasolabial flap, buccal flap, skin graft or other artificial material can also be used. But in small to medium sized defect only BFP is sufficient with 6 months follow up.

Mandible was the least choice for buccal fat pad grafting. Agarwal et al describes BFP as a root covering material.[15] However, they have stated, BFP might not suitable for root coverage in anterior and mandibular teeth. Oral squamous cell carcinoma was the most common reason for BFP transplantation. In Indian subcontinent, application of BFP in oral sub mucous fibrosis is also increasing.

The important advantages of using the BFP include a lower incidences of infection, absorption after reconstruction and it can be used in association with other flaps as a second layer.[16] On the other hand the main disadvantage is contraction. This may results limitation in mouth opening. Chien et al[16] have calculated the width of the jaw opening after reconstruction using 3 different strategies: the forearm free flap, the skin graft, and the BFP flap. The widths in these cases were 7.4%, 24.5%, and 33.1%, respectively. In the presented cases there were no instances of limited mouth opening after reconstruction. However, authors also recommend using multiple flaps with BFP in larger defect. In addition, absence of any inflammatory signs is absolutely mandatory for surgical success. The possible complications in BFP reconstruction are pain more than 2 weeks, limited mouth opening, cheek deformity, prosthetic problems and recurrent oroantral communication.

Conclusion

We would like to conclude by stating that, BPF is a safe and effective interposition graft material with advantages for correction of any small to medium surgical defects in intra oral region.

Conflict of interest statement

None declared.

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Ethical approval

Not required.

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